ISSN No:-2456-2165

Sound Pollution Effect on Performance Rate of Senior Students

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Abstract:- Sound pollution is a wave function represented by

$$P_t = \sum_1^n An\ Sin\ (nwt + \emptyset_n)$$

Where
An= Amplitude of the N^R harmonic
ϕ = Phase amplitude of the N^R harmonic
C_n= Complex amplitude of the harmonic
ω = 2πf⇒ angular frequency

The sound wave is sinusoidal and a pressure function. The study tries to find out the impact of sound on the learning rate, using the university of Port Harcourt demonstration secondary school students for the investigation.

- ***Requirements are***
- **Sound mixer**
- **Volume controller and amplifier**
- **Taped lectures under generator noise condition.**

The noise between 50dBA and 95dBA±2 where administered with taped lecture to both junior and senior secondary arms at the introductory technology workshop. Taking concentration to be a pressure function of the noise element, it then implies;

$$\text{Pressure} = \frac{Force}{Area} \equiv L_r \frac{\int Aptitude + \int learnability}{noise\ factor}$$

The greater the noise factor the lesser the "Lr" learnability because of distraction. The study revealed a significant difference in performance of P-value (0.00) at treatment "2" for 95 dBA ± 2 noise level and coherence among the blocks. While 50 – 60 dBA control and 70 – 80 dBA treatment "1" showed no significant difference. We recommend that 50 dBA noise standard for the learning environment be encouraged inspire of motor traffic noise intrusion into most Nigerian institutions and generator noise.

I. INTRODUCTION

Sound pollution is topical issue due to urbanization and industrialization. A lot of studies on noise impact have also been conducted across the globe.

A. The authors include

Evans Maxwell (1997), Farcas (2008), Goswami (2009), Harabidis (2008), Lehman and Tamm (19656), Lisa and Louis (2007), Mehdi (2002), Nuzhar *et al.* (1998), Ozer *et al.*, (2009), Raj *et al.* (2004), Richard *et al.* (2007), Suh *et al.* (2010), Thiery *et al.* (1988), Vervijmeren (1987), Wang *et al* (2005), Wang (2008), Yeowart *et al* (1977). They jointly establish that noise has hazardous and mild effect ranging from acoustic trauma, hearing loss, speech interference, sleep disturbance, reduction in work safety, causes headache, anxiety, depression, neurosis and psychosis when combined with drug and substance abuse, particularly in clubs.

The study this time is to experimentally find out the sound pollution effect on the learning rate of students via performance evaluation. It established that hence sound and force are pressure dependent, then;

$$\text{Pressure} = \frac{Force}{Area} \equiv Learning\ rate\ (L_r) = \frac{\int Aptitude + \int learnability}{Noise\ Factor}$$

This implies the more the noise element, the lesser the concentration and job performance.

II. MATERIALS AND METHODS

This study tries to quantify the impact of noise on learning rate of students under varied level of noise intensity in dBA. Our study site is the University of Port Harcourt demonstration secondary school students where the research person was employed as a physic teacher. A model sound transmitter, constructed by the researcher for his Masters was used with the help of a mixer and volume control to program the lectures into tapes. The topic of choice was the concept of matter and the energy for the junior class and electricity and magnetism for the senior class which has not been treated as at the time of the research. This is to reduce residual background effect in performance. The lectures were transmitted twice on duration 15 minutes each for the junior secondary and 20 minutes for the senior secondary after which they were given 25 objective questions to answer in 30 minutes. The questions were administered to a control group and two treatment groups with variant sound intensity of 50-60 dBA for the control, 70 – 80 dBA for treatment 1 and 95 dBA ± 2 for treatment 2.

The data is as reflected on the table 1-6 below with their respective analysis.

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III. RESULTS AND ANALYSIS FOR JS I STUDENTS

IV. Table 1:Descriptive Statistics: CONTROL 50 - 60, TREATMENT 70 - 80, TREATMENT 95 ±2

Group 1

Variable	N	N*	Mean	StDev	Minimum	Maximum
CONTROL 50 - 60	10	0	51.80	6.14	40.00	60.00
TREATMENT 70 - 80	10	0	46.80	7.79	32.00	56.00
TREATMENT 95 ± 2	10	0	28.80	7.25	20.00	40.00

Table 2:Descriptive Statistics: CONTROL 50 - 60, TREATMENT 70 - 80, TREATMENT 95 ±2

Group 2

Variable	N	N*	Mean	StDev	Minimum	Maximum
CONTROL 50 - 60	10	0	50.00	6.32	36.00	56.00
TREATMENT 70 - 80	10	0	48.00	5.33	40.00	56.00
TREATMENT 95 ± 2	10	0	25.60	6.31	16.00	36.00

Table 3:Descriptive Statistics: CONTROL 50 - 60, TREATMENT 70 - 80, TREATMENT 95 ±2

Group 3

Variable	N	N*	Mean	StDev	Minimum	Maximum
CONTROL 50 - 60	10	0	48.00	9.04	32.00	60.00
TREATMENT 70 - 8	10	0	45.20	7.55	36.00	56.00
TREATMENT 95 ± 20	10	0	25.80	5.53	20.00	36.00

Table 4:Descriptive Statistics: CONTROL 50 - 60, TREATMENT 70 - 80, TREATMENT 95 ±2

Group 4

Variable	N	N*	Mean	StDev	Minimum	Maximum
CONTROL 50 - 60	10	0	47.00	5.75	36.00	56.00
TREATMENT 70 - 80	10	0	48.40	6.10	36.00	56.00
TREATMENT 95 ± 2	10	0	25.40	8.85	12.00	40.00

V. GROUP MEANS SUMMARY

Group / Treatment	Control 50 – 60	Treatment 70- 80	Treatment 95 ±2
Group 1	51.8	46.8	28.8
Group 2	50.0	48.0	25.6
Group 3	48.0	45.2	25.8
Group 4	47.0	48.4	25.4

Table 5:-Group means summary

Using a two-way ANOVA, the p-value (0.000) showing a significant difference between treatments and control. From the 95% confidence Interval above, the control 50-60 and treatment70-80 are the same effect, while treatment95±2differ.

Using a two-way ANOVA, the p-value (0.235) shows no significant difference between the groups. The 95% confidence Interval confirms that the groups have the same effect.

VI. RESULTS AND ANALYSIS FOR SS 1 STUDENTS

Table 6: Descriptive Statistics: CONTROL 50 - 60, TREATMENT 70 - 80, TREATMENT 95 ± 2

Group 6

Variable	Mean	SE Mean	StDev	Minimum	Maximum
CONTROL 50 - 60	75.60	1.51	4.79	68.00	84.00
TREATMENT 70 - 80	70.00	1.49	4.71	64.00	76.00
TREATMENT 95 ± 2	39.60	3.18	10.06	24.00	56.00

Table 7: Descriptive Statistics: CONTROL 50 - 60, TREATMENT 70 - 80, TREATMENT 95 ±2
Group 7

Variable	Mean	SE Mean	StDev	Minimum	Maximum
CONTROL 50 - 60	75.60	1.26	3.98	68.00	80.00
TREATMENT 70 - 80	68.00	1.89	5.96	60.00	76.00
TREATMENT 95 ± 2	38.80	1.69	5.35	32.00	48.00

Table 8: Descriptive Statistics: CONTROL 50 - 60, TREATMENT 70 - 80, TREATMENT 95 ±2
Group 8

Variable	Mean	SE Mean	StDev	Minimum	Maximum
CONTROL 50 - 60	74.00	1.07	3.40	68.00	80.00
TREATMENT 70 - 80	69.60	1.60	5.06	60.00	76.00
TREATMENT 95 ± 2	35.60	1.73	5.48	28.00	48.00

Table 9: Descriptive Statistics: CONTROL 50 - 60, TREATMENT 70 - 80, TREATMENT 95 ±2
Group 9

Variable	Mean	SE Mean	StDev	Minimum	Maximum
CONTROL 50 - 60	74.200	0.629	1.989	72.000	76.000
TREATMENT 70 - 80	70.00	1.37	4.32	64.00	76.00
TREATMENT 95 ± 2	34.80	2.86	9.05	20.00	52.00

VII. GROUP MEANS SUMMARY

Group / Treatment	CONTROL 50 - 60	TREATMENT 70- 80	TREATMENT 95 ±2
Group 1	75.6	70.0	39.6
Group 2	75.6	68.0	38.8
Group 3	74.0	69.6	35.6
Group 4	74.2	70.0	34.8

Table 10: Group Means summary

Using a two-way ANOVA analysis, the p-value (0.000) shows a significant difference between treatments and control. From the 95% confidence Interval above, the control

50-60 and treatment70-80 are the same effect, while treatment95±2differ.

Using a two-way ANOVA analysis, the p-value (0.347) shows no significant difference between groups. The 95% confidence Interval confirms that the groups have the same effect.

VIII. CONCLUSION

There is a negative co-relationship between noise intensity and learning rate which consequently affect performance. Acoustic measure are required to reduce noise intrusion in classes while students should be encouraged to reduce traffic noise, conversation and vibration from handsets. Schools should be sited away from industrial areas

while some regulatory measure could be applied. The movement of desk generate noise and the desk should be demobilized by joining the columns together.

REFERENCE

[1]. Ogoke, U.P., Nduka, E.C., Biu, O.E., and Ibeachu C. (2013). A Comparative Study of Foot Measurements Using Receiver Operating Characteristics (ROC) Approach. International Journal of Pure & Applied Sciences (Scientia Africana) 12(1), p.76-88.

[2]. Evans, G.W., Maxwell, L. (1997): Chronic noise exposure and reading deficits: The mediating effects of language acquisition, u.o.: Environment and Behavior.

[3]. Farcas, Florentina. (2008): "Road Traffic Noise: A study of Skane region", Sweden. http://www.isprs.org/proceedings/XXXVin/2-Wl 1/Farcas Sivertun.pdf (Access date: 10-09-2010).

[4]. Goswami, Sh.: (2009), "Road Traffic Noise: A case study of Balasore Town, Orissa, India", Tnt. J. Environmental Resources., 3(2):309-316, spring.

ISSN No:-2456-2165

[5]. Harabidis, A. S. (2008): "Acute Effect of Night-Time Noise Exposure on Blood Pressure in Population Living Near Airports", European Heart Journal http://www.najah.edu/thesis/5171651.pdf (Access date: 10-09-2010).

[6]. Lehman, G., J, Tamm. (1956): "Changes of circulatory dynamics of resting men under the effects of noise", Intl. Z Angew Physiolo., p.217-227.

[7]. Lisa, Goines. R. N., Louis, Hagler, M.D. (2007): "Noise Pollution: A Modern Plague", Southern Medical Journal, Lippincott Williams and Wilkins, pp 287-294. http://www.medscape.com/viewarticle/554566 (Accessed on 14-08-2011).

[8]. Lord, P., Thomas, F. L. (1963): "Noise measurement and control", Heywood and Company Ltd, London, p. 12-62.

[9]. Mehdi, Muhammad. Raza. (2002): "Spotting noise risk zones in Karachi Pakistan : A GIS Perspective", Karachi.http://www.gisdevelopment.net/proceedings/gisdeco/ sessions/Mehdipf.htm (Access date: 10-09-2010).

[10]. Nuzhat, Huma., Akhtar, Zahir, Shah. Mohammad., Qamar, Ismail. (1998): 'Road traffic noise in Peshawar: An increasing problem", Department of community medicine, Khyber Medical College.

[11]. Ozer, Serkan., Yilmaz, Hasan., Ye§il, Murat., Ye§il, Pervin. (2009): "Evaluation of noise pollution caused by vehicles in the city of Tokat", Turkey, 2009. Scientific Research and Essays VoL 4 (11), pp. 1205-1212, ISSN 1992- 2248 Academic Journals. http://www.academicjoumals.org/sre/abstracts/abstracts/abstracts%202009/Nov/Qzer%20et %20al.htm (Access date: 10-09-2010).

[12]. Raj, Kamla., Singh, Narendra. and Davar, S. C. (2004): "Noise Pollution- Sources, Effects and Control", J. Hum. Ecol., 16(3): 181-187 Haryana, India.

[13]. Richard, NeitzeL, Noah, S., Seixas, Janie. Camp., Michael, Yost. (1999): "An Assessment of Occupational Noise Exposures in Four Construction Trades", American Industrial Hygiene Association Journal, 60(1), 807-817. http://www.ncbLnlni.nih.gov/pubnied/10635548 (accessed on 17-08-2011).

[14]. Roba, Mohammed., Saeed, Anis. (2010): "The Effects of Noise Pollution on Arterial Blood Pressure and Heart Pulse Rate of School Children at Jenin City", Palestine.

[15]. Smith, B.J. Peter, R. J., Owen, S. (1996): "Acoustics and noise control", 2nd Edition, Published by addison Wesley Longman Limited, p. 1.

[16]. Stephen, A., Stansfeld, Mark, P., (2007): Matheson, "Noise pollution: non-auditory effects on health", British Medical Bulletin, Volume 68, Issue 1, pp243-257.http://bmb.oxfordioumals.org/content/68/l/243.abstract (Accessed on 14-08-2011).

[17]. Suh, Meei. Hsu., Wen, Je. Ko. (2010): "Associations of exposure to noise with physiological and psychological outcomes among post-cardiac surgery patients in ICUs", Clinics (Sao Paulo), October, pp 985-989.

[18]. Thiery, L., Meyer, C. Bisch. (1988): "Hearing loss due to partly impulsive industrial noise exposure at levels between 87 and 90 dB (A), Journal of Acoustical Society of America, Vol. 84, Issue 2, pp. 651-659. http://asadLorg/jasa/resource/l/ jasman/v84/i2/p651 si (accessed on 26-07-2011).

[19]. Verwijmeren, M. A. P. (1987): "An information for the introduction of new occupational noise legislation in the Netherland",, Inter-noise 87, p.1613-1616.

[20]. Wang, Lawrence. K., Pereira, Norman. C., Hung, Yung. Tse. (2005): "Advanced air and noise pollution", Human Press, Totowa, New Jersey.

[21]. Wang, Qi. (2008): "Application of grey relational analysis and hierarchical cluster analysis in regional environmental noise pollution", IEEE Xplore, Issue Date 18-20 Nov. 2007,pp 336 - 340, Nanjing, http://ieeexplore.ieee.org/xpl/freeabs all.jsp?arnumber=4443292

[22]. Yeowart, N.S., Wilcox, D. J., Rossall, A.W: (1977) "Community reactions to noise from freely flowing traffic, motorway traffic and congested traffic flow", Journal of sound and vibration, vol. 53 (1), pp 127-145